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SOIL ENHANCER

[Dojo Kairyozai]

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Specification

1. Title of the invention

SOIL ENHANCER

2. Claims

1. A soil enhancer, characterized by the fact that a ferromagnetic iron oxide is used as a main component.

2. The soil enhancer of Claim 1, characterized by the fact that the above-mentioned ferromagnetic iron oxide is granulated to a prescribed particle size.

3. Detailed explanation of the invention

The present invention pertains to a soil enhancer effective for the growth of plants.

In the growth of plants, three elements of nitrogen, phosphoric acid, and potassium, water, oxygen, and an infinitesimal amount of various elements are required. Also, in order to supply the above-mentioned nutrients to the roots of the plants, it is essential for soils to have an appropriate retention force, however the air circulation must be good. In a clay, though the retention force of the nutrients is strong, the

[1] Numbers in the margin indicate pagination in the foreign text.

air circulation is poor, and in sands, though the air circulation is good, the retention force of the nutrients is small. Also, in general soils, a certain % of the fertilized nutrients outflows, is introduced into rivers or swamps, and in particular, the inflow of the phosphoric acid system fertilizer causes a secondary nutrition, resulting in a large social problem. It is influenced by the decrease of the adsorption of the nutrients of the soils other than the excess of the fertilization. In snowfall areas, charcoal powder, etc., are dispersed on ground snows cumulated on a field, and the snow melting timing is accelerated by effectively utilizing the solar heat. Since the charcoal powder is very light, it is easily dispersed by the wind.

The purpose of the present invention is to provide a soil enhancer that holds nutrients required for the roots of plants, improves the air circulation, promotes the growth of the plants by utilizing a magnetic action, and stimulates the snow melting of snowfall areas.

According to the present invention, since a ferromagnetic iron oxide absorbs ammonia, potassium, phosphoric acid, etc., nutrients can be effectively supplied to the plants by mixing the above-mentioned ferromagnetic iron oxide into a soil or using it as a soil. Furthermore, the above-mentioned /2

ferromagnetic iron oxide is granulated at a prescribed particle size, so that the adsorption of the above-mentioned nutrients is increased and the air circulation to the roots is also improved. Also, from recent researches, it has been found out that the above-mentioned ferromagnetic iron oxide condenses a geomagnetism, generates a strong magnetic gradient around the roots of plants, and promotes the growth of the plants. On the other hand, since the soil enhancer of the present invention uses a ferromagnetic material such as ferrite as a main component, it is black or close to black (for example, black in a magnetite Fe_3O_4) and absorbs the solar heat with good efficiency. Therefore, if the above-mentioned soil enhancer is dispersed on snows cumulated in a field in snowfall areas, it effective absorbs the solar heat, the snow melting time can be largely accelerated, and exhibits a large effect as a soil enhancer on the growth of plans after melting the snow. Furthermore, the ferromagnetic iron oxide has a high density (5 g/cm^3 in the magnetite) and is easily dispersed after spraying. Also, the soil enhancer of the present invention has sufficient adsorption of nutrients, especially phosphoric acid in a fertilizer and prevents the phosphoric acid from being discharged to rivers or lakes or swamps from fields and simulating the secondary nutrition of the water quality.

The ferromagnetic oxide iron being used in the soil enhancer of the present invention is chemically very stable and neither generates rusts nor is decomposed and eluted, even by exposing to wind, rain, sun rays, etc. The above-mentioned ferromagnetic iron oxide can be obtained at a large amount as a by-product in the manufacture of titanium or a by-product of a heavy metal waste solution treatment. Also, as the above-mentioned magnetic iron oxide, a spinel type ferrite containing magnesium, nickel, or zinc is also effective in addition to magnetite (Fe_3O_4) of Margemite[transliteration] (γ-Fe_2O_3) of only iron.

Next, an application example of the present invention is explained in detail based on the figures.

Figure 1 is a cross section showing an apparatus for culturing a tomato tree 1 using the soil enhancer of the present invention. As the soil enhancer of the present invention, a magnetite (Fe_3O_4) granulated at a particle diameter of 0.5-2 mm was mixed with a general field soil at a volume ratio of 1:1 and assumed as a soil 3 for culture. Also, the drainage was improved using a magnetite (Fe_3O_4) granulated at a particle diameter of 5-10 mm in the part shown by a lower part 4 of the soil 3 for culture. As the method for granulating the soil enhancer of the present invention, particles with a diameter of

0.5-2 mm and 5-10 mm were obtained, however in addition to the sintering method, a solidifying method using a water-insoluble resin such as vinyl chloride resin is also adopted. Using an apparatus for culturing a tomato similar to that of Figure 1 except for using only a field soil as the culture soil 3 of the apparatus shown in Figure 1 and gravels with a particle diameter of 5-10 mm in the part 4, the effects of the soil enhancer of the present invention were tested. In other words, 20 each of tomatoes using the soil enhancer of the present invention and without using the soil enhancer were cultured, and the environments such as kind and size of tomato seedlings, filed soil, external air temperature, and sunshine duration were made uniform. As nutrients, three elements of nitrogen, phosphoric acid, and potassium were mixed at an optimum ratio, and a Hibonex[translation] as a raw material was diluted to a concentration of 1,000 times with water and precisely given at each same amount once a day. After fruit-bearing, when the tomatoes were simultaneously harvested from 40 pieces of trees, the harvest was increased by 12% in weight in the case where the soil enhance of the present invention was used, compared with the case where the soil enhancer was not used. Also, when the solution being discharged from a drainage port 6 of the lower part of a culture container 5 was sampled and phosphoric acid

ions existing in the above-mentioned solution were quantified, the concentration of the phosphoric acid ions in the above-mentioned solution was about 1/5 as an average value in the case where the soil enhancer of the present invention was used, compared with the case where the soil enhancer was not used. In the quantification of the phosphoric acid ions, all the phosphorus components were oxidized to a regular phosphoric acid ($PO4^{3-}$) by perchloric acid in the pretreatment, colored with ammonium molybdenate and hydrazine sulfate, and quantified by a colorimetry.

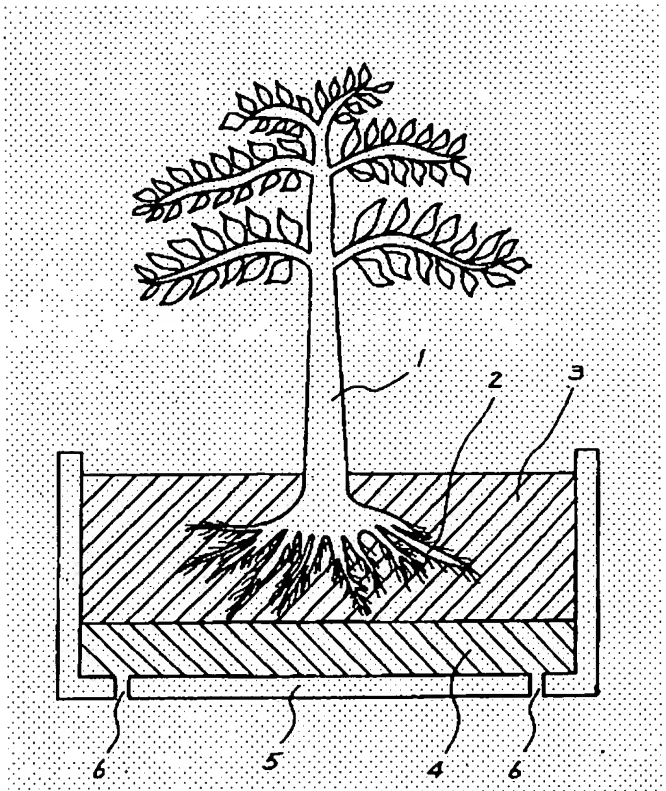
Figure 2 shows an application example in which magnetites (Fe_3O_4) granulated at a particle diameter of 0.1-1 mm were spread as a soil enhancer 8 of the present invention on the surface of snows 9 cumulated on ridges 10 of a field. Sun rays 7 are effectively absorbed by the black magnetites (Fe_3O_4) 8 and warms the surface of the snows 9. Since the fallen and cumulated snows are white, almost all the sun rays are reflected by the snows, however if the soil enhancer with black or close to black is sprayed on the surface of the snows, the thermal energy of the sun rays is indirectly received, and the continuous covered snows are melted fast, so that the snow melting timing of snowfall areas can be largely accelerated. After melting the snows, the field soil and the magnetites are easily mixed, so /3

that a markedly favorable effect can be exerted on the growth of the above-mentioned plant shown in Figure 1.

4. Brief description of the figures

Figure 1 shows an application example of a tomato culture using the soil enhancer of the present invention. 1 is a tomato tree, 2 is a tomato root, 3 is a culture soil in which the soil enhancer of the present invention and a field soil are mixed, 4 is a soil enhancer of the present invention, 5 is a culture container, and 6 is a drainage port.

Figure 2 shows an application example in which the soil enhancer of the present invention is used in accelerating melting of continuously covered snows cumulated on a field. 7 is a sun ray, 8 is a soil enhancer of the present invention, 9 is a snow, and 10 is a ridge of the field.



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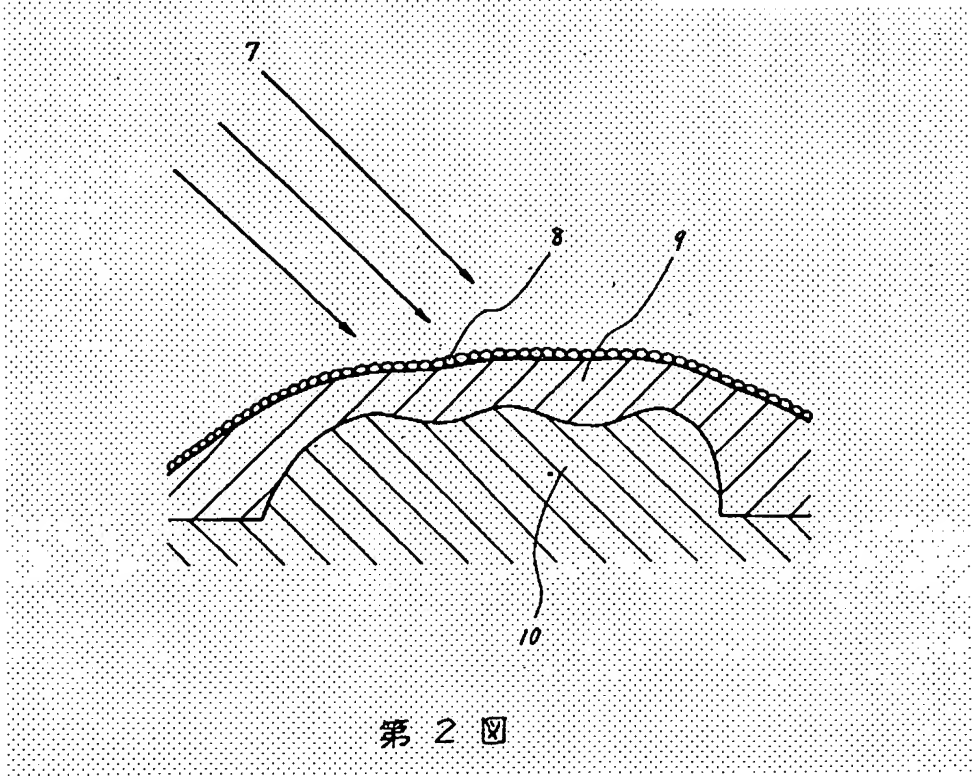

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